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February 23, 2007

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit No. 1; Docket No. 50-317
Letter of Intent to Irradiate Lead Fuel Assemblies Above the Current Maximum Burnup Limit

Calvert Cliffs Nuclear Power Plant submits the following information to notify the Nuclear Regulatory Commission (NRC) of its intent to irradiate a limited number of lead fuel assemblies (LFAs) above the current maximum burnup limit. The LFAs are part of the irradiation program originally submitted for approval in References (a) and (b) to test advanced cladding materials. In the original program, there are four LFAs manufactured by Westinghouse Electric Company (Westinghouse) and four assemblies manufactured by AREVA. These eight LFAs were approved for insertion into Calvert Cliffs Unit 2 Cycles 15 and 16 to begin irradiation in 2003, References (c) and (d). The assemblies are currently in their second cycle of irradiation which is scheduled to end in February 2007.

The original intent of the program was to irradiate these eight assemblies for a third cycle and an explicit submittal was to be provided at that time. However, since References (a) and (b) were generated, Calvert Cliffs has re-evaluated the LFA program and modified it slightly as explained in References (e) and (f).

The modification consists of four of the eight LFAs (two from each manufacturer) to be returned immediately to the core for a third cycle of irradiation (into either Unit 1, Cycle 19 or Unit 2, Cycle 17) in low duty locations on the core periphery to allow evaluation of grid-to-rod fretting resistance. References (e) and (f) are the Exemption and License Amendment Request to allow the irradiation of these LFAs. These requests proposed the use of advanced cladding while not exceeding the current peak burnup limitation of 60 GWD/MTU. References (g) and (h) document NRC-approval of these requests.

The purpose of the current letter is to notify the NRC of our intent to irradiate the other four LFAs above the current maximum burnup limit. The nuclear industry has submitted a Topical Report, Reference (i), to justify the use of limited scope high burnup LFAs. This Topical Report has been approved by the NRC (References j and k) and provides eight conditions for allowing limited LFA irradiation to high burnup. We understand that even though the Topical Report is a Westinghouse report, it is approved for the entire nuclear industry and may be used for the AREVA LFAs as well as the Westinghouse LFAs (Reference i).

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Attachments (1) and (2) address how the LFAs meet six of the eight conditions set forth in Reference (j). The remaining two conditions are discussed below.

1. If the Core Operating Limits Report analytical methods listed in the licensee's Technical Specifications were approved up to a specified burnup limit, a license amendment is required to add this topical report to that list in order for licensees to be able to use this topical report.

   Discussion – A license amendment will be requested to add appropriate topical reports to the Core Operating Limits Report analytical methods list in Technical Specification 5.6.5.

2. The licensee shall submit a notification of intent to irradiate LFAs above the current burnup limit. It shall consist of at least the following information:

   - Licensee Name – Calvert Cliffs Nuclear Power Plant, Inc.
   - Plant Name – Calvert Cliffs Nuclear Power Plant
   - Cycle and date when the LFA shall be inserted – Unit 1, Cycle 19 – Expected date February/March 2008
   - Number of LFAs – Two Westinghouse LFAs and two AREVA LFAs
   - Location of the LFAs – The design of Unit 1, Cycle 19 is not yet complete, but it is expected that the assemblies will be inserted into an internal high power location in order to achieve the desired higher burnup.
   - Anticipated pre-and post-cycle burnups for each LFA –

     Pre-cycle Burnup – The peak pin burnup of the LFAs is expected to be in the range of 49.5 to 52 GWD/MTU at the beginning of Unit 1, Cycle 19

     Post-cycle Burnup – < 70.0 GWD/MTU (peak pin)

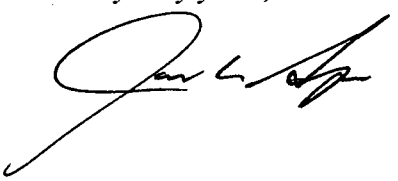
   - Purpose of LFAs – Evaluate fuel rod and fuel assembly performance at a projected peak pin burnup of up to 70 GWD/MTU.
   - Estimated dates for the pre-and post-irradiation characterization or the results of pre-characterization and an estimate of the date for the post-irradiation characterization. – The pre-irradiation characterization is scheduled to be performed in 2007 and the post-irradiation characterization is expected to be completed in 2010.
   - Estimated date of the pre- and post-irradiation examination report. – The proprietary pre-irradiation characterization report and the proprietary post-irradiation examination report will both be provided to the NRC by the end of July 2011.
   - Statement that the LFAs will not be irradiated if certain conditions are not met or if the pre-characterization examinations show anomalous results – Alternate assemblies or modified LFAs will be used in Unit 1, Cycle 19 if certain conditions [Conditions 4 and 5 in Attachments (1) and (2)] are not met or if the pre-characterization examinations show anomalous results. The current licensed fuel performance code predictions for the developmental claddings will be compared to examination data for the lead test assemblies at Calvert Cliffs after two cycles of irradiation. If significantly adverse observations are found relative to the predictions, the affected rod(s) will either be removed and the fuel assembly will be reconstituted with suitable replacement rods

(including stainless steel insert pins, if necessary), or the entire fuel assembly will remain in the spent fuel pool until the deviations are understood and addressed.

We request that the NRC provide approval or acknowledgement of our intent to irradiate these LFAs beyond the currently allowed burnup limits. The re-insertion of the LFAs is currently scheduled to occur during the next Unit 1 refueling outage, which is expected to begin in February or March 2008. Should this request not be acknowledged or granted, we would need to select and analyze alternate fuel assemblies for the Unit 1, Cycle 19 core. Therefore, we request that NRC action on this matter be completed by December 1, 2007.

Should you have questions regarding this matter, please contact Mr. Jay S. Gaines at (410) 495-5219.

Very truly yours,



JAS/PSF/bjd

REFERENCES:

(a) Letter from Mr. P. E. Katz (CCNPP) to Document Control Desk (NRC), dated July 17, 2002, Westinghouse Lead Fuel Assemblies – Temporary Exemption Request and License Amendment Request

(b) Letter from Mr. P. E. Katz (CCNPP) to Document Control Desk (NRC), dated August 6, 2002, Framatome Lead Fuel Assemblies – Temporary Exemption Request and License Amendment Request.

(c) Letter from Mr. G. S. Vissing (NRC) to Mr. P. E. Katz (CCNPP), dated April 14, 2003, Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 - Amendments Re: Lead Fuel Assemblies (TAC Nos. MB5646, MB5647, and MB6064)

(d) Letter from Mrs. G. S. Vissing (NRC) to Mr. P. E. Katz (CCNPP), dated April 11, 2003, Exemption from the Requirements of 10 CFR 50.44, 10 CFR 50.46, and 10 CFR Part 50, Appendix K (TAC Nos. MB5648 and MB6065)

(e) Letter from Mr. J. A. Spina (CCNPP) to Document Control Desk (NRC), dated January 19, 2006, Temporary Exemption Request for Use of Lead Fuel Assemblies

(f) Letter from Mr. J. A. Spina (CCNPP) to Document Control Desk (NRC), dated February 27, 2006, License Amendment Request: Use of Lead Fuel Assemblies

(g) Letter from Mr. P. D. Milano (NRC) to Mr. J. A. Spina (CCNPP), dated November 9, 2006, Exemption from the Requirements of 10 CFR 50.46 and 10 CFR 50 Appendix K (TAC Nos. MC9615 and MC9616)

(h) Letter from Mr. P. D. Milano (NRC) to Mr. J. A. Spina (CCNPP), dated November 16, 2006, Amendments re: Use of Lead Fuel Assemblies (TAC Nos. MD0243 and MC0244)

(i) WCAP-15604-NP Revision 2-A, "Limited Scope High Burnup Lead Test Assemblies," September 2003

(j) Letter from W. H. Ruland (NRC) to R. H. Bryan (Westinghouse), dated January 8, 2003, Acceptance for Referencing of Topical Report WCAP-15604-NP, Revision 1

(k) Letter from Mr. H. N. Berkow (NRC) to Mr. R. H. Bryan (Westinghouse), received August 28, 2003, Response to Comments from the Westinghouse Owners Group on the Safety Evaluation for WCAP-15604-NP, Revision 1

Attachments: (1) Conditions for Allowing Limited Lead Fuel Assemblies to be Irradiated above a Lead Rod average Burnup of 60 GWD/MTU (Westinghouse LFAs)
(2) Conditions for Allowing Limited Lead Fuel Assemblies to be Irradiated above a Lead Rod average Burnup of 60 GWD/MTU (AREVA LFAs)

cc: D. V. Pickett, NRC
S. J. Collins, NRC
Resident Inspector, NRC
R. I. McLean, DNR

ATTACHMENT (1)

CONDITIONS FOR ALLOWING LIMITED LEAD FUEL ASSEMBLIES TO BE IRRADIATED ABOVE A LEAD ROD AVERAGE BURNUP OF 60 GWD/MTU (WESTINGHOUSE LFAs)

Calvert Cliffs Nuclear Power Plant, Inc.
February 23, 2007

ATTACHMENT (1)

CONDITIONS FOR ALLOWING LIMITED LEAD FUEL ASSEMBLIES TO BE IRRADIATED ABOVE A LEAD ROD AVERAGE BURNUP OF 60 GWD/MTU (WESTINGHOUSE LFAS)

1. The number of fuel assemblies with fuel rods exceeding the current lead rod average burnup shall be limited to a total of nine in pressurized water reactors (PWRs) and thirty-two in boiling water reactors (BWRs). No fuel rods shall exceed peak rod average burnups greater than 75 GWD/MTU.

   Discussion: The total number of assemblies being irradiated to high burnup is four (two manufactured by Westinghouse and two manufactured by AREVA). The target lead rod average burnup at end-of-life will be ≤ 70 GWD/MTU.

2. The fuel shall be typical production fuel and be pre-characterized before operation above the current lead rod average burnup limit. The fuel may also be a lead fuel assembly (LFA) that was characterized during fabrication and was designed to test aspects of the fuel assembly but was not initially identified as a high burnup LFA. The latter fuel shall be pre-characterized before operation above the current lead rod average burnup limit. The fuel clad material is an Nuclear Regulatory Commission (NRC)-approved clad material.

   Discussion: The fuels used in this application are LFAs to test current and advanced cladding alloys (Reference 1) performance at high burnup. As such, some of the clad alloys are not standard production NRC-approved clad material. The NRC has previously approved Calvert Cliffs to use these advanced cladding alloys in Unit 2, Cycle 15 and Unit 2, Cycle 16 (Reference 2). An exemption letter will be submitted to the NRC to now allow these advanced cladding materials in Unit 1, Cycle 19 for their 3rd cycle of irradiation. The fuel rods were characterized during fabrication and will be examined poolside prior to insertion for the high burnup cycle. The LFAs were previously analyzed using the Westinghouse's approved fuel performance methodology and models and were found to provide acceptable performance up to a peak rod burnup of 70 GWD/MTU. The assembly growth and shoulder gap correlations used will be verified following the poolside examination to assure acceptable margin exists prior to re-insertion for the high burnup cycle.

3. The pre-characterization of the fuel shall consist of at least the following examinations: clad oxidation, rod/assembly growth, and visual examinations for PWRs, and clad oxidation, rod/assembly growth, channel bow, and visual examinations for BWRs.

   Discussion: The pre-characterization of the Westinghouse LFAs will include examinations for clad oxidation, rod/assembly growth, and visual inspections.

4. The post-irradiation examinations of the fuel shall consist of at least the following examinations: clad oxidation, rod/assembly growth, and visual examinations for PWRs and clad oxidation, rod/assembly growth, channel bow, and visual examinations for BWRs burn-up limits. Current or modified fuel performance methods and codes shall be used.

   Discussion: The post-irradiation examinations will be performed in accordance with the requirements, and should commence in 2010.

5. The fuel shall be evaluated against and must meet all current design criteria even though the current analytical methodologies may not be approved for use at the higher burnups.

   Discussion: The fuel will be evaluated with the current analytical methods to evaluate the expected changes during the third cycle of irradiation. These predicted changes along with the pre-irradiation

measured results (measurements prior to reinsertion in Unit 1, Cycle 19) will be used to assure that design criteria are met.

Based on the fact that the developmental alloys are similar to alloys already evaluated in a test reactor (Optimized ZIRLO has been tested in multiple commercial reactors) and substantial out of pile tests have been conducted on these materials, the actual performance of the developmental claddings are expected to be bounded by the predictions obtained from the licensed fuel performance codes. No new design limits were established for these developmental claddings (i.e., the current design limits will be used).

Where appropriate, concurrent data obtained from other programs for the same developmental claddings will be factored into the assessment of the lead fuel assemblies now being irradiated in Calvert Cliffs Unit 2. Specifically, before the assemblies are inserted into Calvert Cliffs Unit 1, Cycle 19, all available information will be reviewed to ensure existing design assumptions remain valid.

6. For all fuel rods in the LFAs, the predicted oxidation shall be less than 100 microns on a best-estimate basis with no blistering or spallation based on the current data.

   Discussion: Measurements to be performed in 2007 along with predictions of the changes expected to occur during the third cycle of irradiation will be used to assure that the oxidation will be less than 100 microns, and no blistering or spallation is expected to occur.

References:

(1) WCAP-15874-P Revision 0, "Safety Analysis Report For Use of Improved Zirconium-Based Cladding Materials in Calvert Cliffs Unit 2 Batch T Lead Fuel Assemblies," April 2002

(2) Letter from Mr. G. S. Vissing (NRC) to Mr. P. E. Katz (CCNPP), dated April 11, 2003, Exemption from the Requirements of 10 CFR 50.44, 10 CFR 50.46 and 10 CFR Part 50, Appendix K (TAC Nos. MB5648 and MB6065)

ATTACHMENT (2)

CONDITIONS FOR ALLOWING LIMITED LEAD FUEL ASSEMBLIES TO BE IRRADIATED ABOVE A LEAD ROD AVERAGE BURNUP OF 60 GWD/MTU (AREVA LFAs)

Calvert Cliffs Nuclear Power Plant, Inc.
February 23, 2007

ATTACHMENT (2)

CONDITIONS FOR ALLOWING LIMITED LEAD FUEL ASSEMBLIES TO BE IRRADIATED ABOVE A LEAD ROD AVERAGE BURNUP OF 60 GWD/MTU (AREVA LFAS)

1. The number of fuel assemblies with fuel rods exceeding the current lead rod average burnup shall be limited to a total of nine in pressurized water reactors (PWRs) and thirty-two in boiling water reactors (BWRs). No fuel rods shall exceed peak rod average burnups greater than 75 GWD/MTU.

   Discussion: The total number of assemblies being irradiated to high burnup is four (two manufactured by Westinghouse and two manufactured by AREVA). The target lead rod average burnup at end-of-life will be ≤ 70 GWD/MTU.

2. The fuel shall be typical production fuel and be pre-characterized before operation above the current lead rod average burnup limit. The fuel may also be a lead fuel assembly (LFA) that was characterized during fabrication and was designed to test aspects of the fuel assembly but was not initially identified as a high burnup LFA. The latter fuel shall be pre-characterized before operation above the current lead rod average burnup limit. The fuel clad material is an Nuclear Regulatory Commission (NRC)-approved clad material.

   Discussion: The fuels used in this application are LFAs testing an alternate PWR fuel manufacturer. This LFA program allows for a direct comparison of M5™ clad performance against current and advanced cladding material performance from our current fuel manufacturer. The M5™ fuel clad material is approved by the NRC as presented in a topical report Reference (1). The fuel rods were characterized during fabrication and will be examined poolside prior to insertion for the high burnup cycle. The LFAs were previously analyzed using the AREVA's approved fuel performance methodology and models and were found to provide acceptable performance up to a peak rod burnup of 70 GWD/MTU. The assembly growth and shoulder gap correlations used will be verified following the poolside examination to assure acceptable margin exists prior to re-insertion for the high burnup cycle.

3. The pre-characterization of the fuel shall consist of at least the following examinations: clad oxidation, rod/assembly growth, and visual examinations for PWRs, and clad oxidation, rod/assembly growth, channel bow, and visual examinations for BWRs.

   Discussion: The pre-characterization of the AREVA LFAs will include examinations for clad oxidation, rod growth, fuel assembly growth, and visual inspections.

   The M5™ cladding exhibits strong resistance to corrosion (demonstrated in burnups as high as 72 GWD/MTU peak rod) and significantly increases protection from corrosion associated with long cycles, high temperatures, and high burnup. The present M5™ database provides a basis for predicting the waterside corrosion thickness accumulated by the M5™ cladding at end-of-life up to burnups of 72 GWD/MTU.

   Post-irradiation examination data have shown that the uniform corrosion rate and irradiation growth for M5™ are less than half of that observed for low tin Zircaloy-4 and hot cell examinations have shown that M5™ has a hydrogen pickup fraction about half that of Zircaloy-4. To date, the maximum measured waterside oxidation layer thickness for M5™ is less than 45 μm (AREVA's worldwide database), which is less than half of the licensed 100 μm thickness limit. The upper limit of the waterside corrosion layer thickness at end-of-life for the LFAs is predicted to be less than half of the licensed 100 μm thickness limit. Due to the large existing AREVA M5™ oxide database, oxide thickness is not expected to be a limiting design parameter.

4. The post-irradiation examinations of the fuel shall consist of at least the following examinations: clad oxidation, rod/assembly growth, and visual for PWRs and clad oxidation, rod/assembly growth, channel bow, and visual examinations for BWRs burn-up limits. Current or modified fuel performance methods and codes shall be used.

   Discussion: The post-irradiation examinations will be performed in accordance with the requirements, and should commence in 2010.

5. The fuel shall be evaluated against and must meet all current design criteria even though the current analytical methodologies may not be approved for use at the higher burnups.

   Discussion: The fuel was evaluated in 2002 using AREVA's licensed methodology, as augmented to include NRC-approved M5™ mechanical properties. This evaluation demonstrates that the fuel meets all current design criteria.

6. For all fuel rods in the LFAs, the predicted oxidation shall be less than 100 microns on a best-estimate basis with no blistering or spallation based on the current data.

   Discussion: Visual examinations will confirm that no blistering or spallation of the fuel rod cladding exists prior to insertion for the high burnup cycle. The predicted oxidation thickness is less than half of the 100 micron limit and no blistering or spallation is expected to occur for the 70 GWD/MTU exposure.

Reference:

(1) 43-10227PA-01 (BAW-10227P-A), "Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel," Framatome Technologies, Inc., Lynchburg, Virginia, June 2003